wherein a ratio between the outer diameter and the inner diameter is between 1.5 and 3.

9. Apparatus for high pressure material processing comprising:

a cylindrical capsule region comprising a first region and a second region, and a length defined by a length the first region and a length of the second region;

an annular heating member enclosing the cylindrical capsule region;

a structure configured to provide axial confinement of pressure generated within the cylindrical capsule region; and

at least two continuous annular cermet members having a thickness disposed continuously around a perimeter of the annular heating member and configured to provide radial confinement for pressure generated within the cylindrical capsule region, each of the at least two continuous annular cermet members being made of a material having a compressive strength of at least 0.5 GPa and a thermal conductivity of less than 100 watts per meter-Kelvin; and

a high strength enclosure ring disposed surrounding each of the at least two continuous annular metal or cermet members to form a high strength enclosure stack,

wherein an interface between two adjacent continuous annular cermet members is located at a position along the length defined between the first region and the second region.

10. Apparatus of claim **9** further comprising a capsule disposed within the cylindrical capsule region.

11. Apparatus of claim **10** wherein the capsule comprises a material selected from gold, platinum, silver, palladium, rhodium, titanium, rhenium, copper, stainless steel, zirconium, tantalum, and alloys of any of the foregoing.

12. Apparatus of claim **10** wherein the capsule is characterized by a deformable material and is substantially chemically inert relative to one or more reactants within the cylindrical capsule region.

13. Apparatus of claim **9** further comprising a cylindrical sleeve member disposed surrounding each of the at least two continuous annular cermet members.

14. Apparatus of claim **13** wherein the cylindrical sleeve member is made of a material selected from stainless steel, iron, steel, iron alloy, nickel, nickel alloy, a combination of any of the foregoing.

15. Apparatus of claim **9** wherein the structure configured to provide axial confinement comprises a first end flange and a second end flange.

16. Apparatus of claim **9** wherein the high strength enclosure ring is made of a material selected from a group consisting of steel, low-carbon steel, SA723 steel, SA 266 carbon steel, 4340 steel, A-286 steel, iron based super alloy, 304 stainless steel, 310 stainless steel 316 stainless steel, 340 stainless steel, 410 stainless steel, 17-4 precipitation hardened stainless steel, zirconium and its alloys, and titanium and its alloys.

17. Apparatus of claim **9** wherein the at least two continuous annular cermet members has an inner diameter between 1.5 inches and 8 inches, a height between 1.5 inches and 8 inches, and an outer diameter, wherein a ratio between the outer diameter and the inner diameter is between 1.5 and 3.

18. Apparatus for growing crystals comprising:

a cylindrical capsule having a length;

a supercritical fluid disposed within the cylindrical capsule;

an annular heater surrounding at least a portion of the cylindrical capsule;

at least two ceramic rings surrounding the annular heater, a metal enclosure ring surrounding each of the at least two ceramic rings, and

a structure configured to provide axial confinement of pressure generated within the cylindrical capsule;

wherein the at least two ceramic rings and the metal enclosure are configured to provide radial confinement for pressure generated within the cylindrical capsule; and

wherein an interface between two adjacent ceramic rings is located at a position along the length of the cylindrical capsule.

19. Apparatus as in claim **18** wherein the metal enclosure ring is configured to resist pressure resulting from heating of the supercritical fluid disposed within the cylindrical capsule.

20. Apparatus of claim **1** wherein the high strength enclosure ring is configured to withstand a load of greater than 0.1 GPa for a predetermined time period and a temperature of 200 Degrees Celsius and below.

21. Apparatus of claim **1** wherein the high strength enclosure ring is made of a material selected from a group consisting of steel, low-carbon steel, SA723 steel, SA266 carbon steel, 4340 steel, A-286 steel, iron based super alloy, 304 stainless steel, 310 stainless steel, 316 stainless steel, 340 stainless steel, 410 stainless steel, 17-4 precipitation hardened stainless steel, zirconium and its alloys, and titanium and its alloys.

22. Apparatus of claim **9** wherein the high strength enclosure ring is configured to withstand a load of greater than 0.1 GPa for a predetermined time period and a temperature of 200 Degrees Celsius and below.

23. Apparatus of claim **1** wherein the annular ceramic member comprises a plurality of radial segments.

24. Apparatus of claim **1** wherein the annular ceramic member comprises a continuous ceramic ring.

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